

The non-financial costs of violent public disturbances: emotional responses to the 2011 riots in England

Article (Accepted Version)

Bencsik, Panka (2018) The non-financial costs of violent public disturbances: emotional responses to the 2011 riots in England. *Journal of Housing Economics*, 40. pp. 73-82. ISSN 1051-1377

This version is available from Sussex Research Online: <http://sro.sussex.ac.uk/id/eprint/76441/>

This document is made available in accordance with publisher policies and may differ from the published version or from the version of record. If you wish to cite this item you are advised to consult the publisher's version. Please see the URL above for details on accessing the published version.

Copyright and reuse:

Sussex Research Online is a digital repository of the research output of the University.

Copyright and all moral rights to the version of the paper presented here belong to the individual author(s) and/or other copyright owners. To the extent reasonable and practicable, the material made available in SRO has been checked for eligibility before being made available.

Copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational, or not-for-profit purposes without prior permission or charge, provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.

The non-financial costs of violent public disturbances: Emotional responses to the 2011 riots in England

Panka Bencsik *

Abstract

The August of 2011 saw the largest riots in the United Kingdom in decades. Half of London's boroughs, as well as neighborhoods in several other cities, were impacted through the more than 200 individual riot events that caused £200 (\$300) million in property damage. Despite widespread media coverage at the time, we know little about what citizens experienced during the riots. This paper bridges that gap using daily response panel data (from the Mappiness smartphone application) to estimate the beyond-monetary costs of the riots. Based on the difference-in-differences estimation, the disturbances substantially increased unhappiness and stress in areas they affected. This negative effect was even more pronounced in areas with the biggest proportion of Black residents, and it also reached a national scale, as even neighborhoods without riots experienced a pronounced wellbeing loss. The negative effects persisted beyond the end of the disturbances, at least until the end of the summer. Citizens changed their behavior in response to the events, respondents in neighborhoods with riots started seeking information and communicating more, which manifested in higher levels of TV watching, texting, email, and social media use. The English riots form part of a larger trend in current social tensions—with a marked wellbeing loss for the majority of Brits.

Keywords: wellbeing, stress, riots, race, deprivation, crime

JEL classification: I31, K42

*University of Sussex, Falmer, Brighton BN1 9RH, United Kingdom
p.bencsik@sussex.ac.uk

I wish to thank George MacKerron, whose insight and expertise greatly assisted the research, while he also kindly shared the Mappiness dataset, of which he is the owner. I am grateful for his multifaceted support, which was invaluable throughout the project.

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

1 Introduction

Riots are a series of violent acts against the existing social order [Lachman, 1996]. Over the course of five August days in 2011 in the United Kingdom (UK), a total of 224 locations—shops, streets, squares—experienced rioting. Many businesses were severely affected, and property damage was widespread. The citizens of Great Britain lived through these days either directly experiencing the riots in their neighborhood, or through watching the news as the events unfolded on TV. The riots had direct monetary costs in terms of extra policing and the substantial addition of cases in the judicial system. However, the riots also had beyond-monetary costs – the negative, non-financial costs citizens experienced living through the time of heightened social tension.

Using Mappiness [MacKerron, 2012], a smartphone application that collects data on happiness and stress levels, I provide an estimation of the direct, in-process emotional impact of riots on citizens for the first time in large-scale applied research. Happiness, with levels that can change daily in a meaningful manner, is well fitted to assess the effect of short, powerful events that slower changing or less often measured indices couldn't capture. In the context of the riots, focusing on unhappiness and stress also allows the consideration of all regions of the United Kingdom, as opposed to monetary costs, such as property damage, that are inevitably localized to where riots took place. Intangible costs, such as fear and anxiety, have been documented to be associated with local crime levels [Dustmann and Fasani, 2016, Braakmann, 2012, Ross and Mirowsky, 2001, Jackson and Stafford, 2009], but due to the unpredictability of riots, associations between mental health and exposure to riots are much harder to measure. Exploiting the data's panel structure, the exact geographic location of each riot event, and each response for each individual, I attempt to estimate a causal relationship between riots and mental wellbeing. I find that the disturbances substantially increased unhappiness and stress throughout the UK. The negative effect didn't remain localized to areas with riots, but functioned as a blanket coverage throughout the entire country, with especially pronounced effects in the treated areas. In areas with riots, the events had a similar effect to Christmas Eve being cancelled; more specifically, the riots had the equal effect in the negative direction as Christmas Eve has in the positive one for the average citizen. The negative effect persisted until the end of the summer, and 'placebo riots' imposed at various earlier times in the same summer show that the impact was unique to the actual treatment time.

Local neighborhood characteristics were associated with a heterogeneity in the effect of the treatment. Respondents in areas with riots and with the highest proportion of Black residents were even more strongly negatively impacted, and the size of the effect was beyond double to other treated areas. Meanwhile, areas with the highest levels of skills deprivation had the opposing effect; they had an uptick in their happiness levels. In qualitative research conducted in the aftermath of the riots [Lewis et al., 2011], participants gave differing motivations for joining in, but one of the key patterns that emerged was their sense of lack of opportunities and of inequality that barred them from moving forward in life. Consequently, people in these skills deprived areas might have been sympathetic to the riots.

Similarly to the effect of crime, the riots also induced behavioral change. TV watching grew substantially, along with personal communication, such as texting, email, and social media use. The time newly devoted to these activities was likely taken away from computer games, as gaming heavily decreased during the riots. Overall, the English riots of 2011 brought about substantial unhappiness and stress, along with altered behavior for the majority of Brits. The non-financial costs were widespread and included those further from the riots as well, leading to a nation-wide negative, beyond-monetary impact.

2 Background

Personally experienced violence has long-lasting, beyond-monetary impacts on the individual, such as on the education performance for pupils [Sharkey et al., 2014]. However, violence that is not individually encountered can have repercussions too. The 9/11 terrorist attacks in the United States, beyond greatly affecting Americans, even caused a wellbeing loss in the British population [Metcalfe et al., 2011]. Similarly to the terrorist attacks in the USA, the London subway bombings in 2005 increased the stress levels of Londoners, with people also reporting changes in their behavior [Rubin et al., 2005]. Riots, due to their unpredictability and rarity in occurrence are sparsely

studied in terms of their impact on individuals. One exception is [Hanson et al. \[1995\]](#)’s study analyzing the aftermath (though surveying only 6 months after the events took place) of the 1992 Los Angeles riots, which finds that people in the areas affected experienced extensive psychological distress and, specifically, post-traumatic stress disorder.

The English riots of 2011 took place 6–10 August, marking a week of violence that affected half the boroughs of London and another 20 cities in England. Starting in Tottenham, in the North London borough of Haringey, the riots expanded to additional boroughs and then further cities each day, reaching a national scale by 8–10 August [\[Moore, 2011\]](#). Two days prior to the riots, on 4 August, a 29-year-old Black Londoner named Mark Duggan was shot and killed by police in the same borough that the riots started in. Duggan was perceived to have a gun on him when shot, according to police, but a subsequent police investigation concluded that Duggan did not have any weapon on him at the time [\[Laville et al., 2011\]](#). On Saturday, 6 August, Duggan’s family and friends organized a peaceful protest march ending at the local police station in Tottenham [\[Briggs, 2012\]](#). With around 300 attendees originally, the protesters demanded that a sufficiently high ranking police representative to come out and speak with them, and when that didn’t happen, they remained outside of the station longer than planned. Around dusk, additional people joined, and the protest took a violent turn. Duggan’s family and others from the original protest left at this time, while the remaining crowd looted and burned shops overnight.

Daylight hours were quiet the following day, 7 August, but looting occurred again after dusk, with hundreds of people joining in. Police were deployed to the scenes of the looting, but could not contain it, especially since looting spread to multiple locations within London. The next daytime was quiet, but the night saw Britain’s heaviest rioting in decades. In addition to looting, a person was shot and another attacked during the riots, both dying of the injuries, and multiple buildings and two double-decker buses were set on fire. The next day, 9 August, the police were deployed at three times the scale of a normal day, which, just like in the case of crime at other times [\[Draca et al., 2011\]](#), resulted in reduced overnight violence. On the last day, 10 August, a hit-and-run killed three people in an area with riots. Aside from that, the riots had practically died down, and only a few additional incidents took place. In the aftermath, [Bell et al. \[2014\]](#) find that there was a disproportionately severe sentencing by the criminal justice system for crimes related to the riots. Based on participant interviews in the aftermath (using a sample of arrested and not arrested riot participants) the majority of the rioters were male (79%); unemployed (among those who were not students, unemployment was 59%, compared to the national level of 8% for the same time period); young (29% aged 10–17, 32% aged 18–20, and 16.5% aged 21–24); and largely non-White (47% Black, 5% Asian, 17% mixed/other, and 26% White) [\[Lewis et al., 2011\]](#). The exact number of participants is unknown, but more than 4,600 people were arrested [\[Draca et al., 2011\]](#), and of that, 2138 people were found guilty by August 2012, a year later [\[Ministry of Justice, 2012\]](#).

Participants said that they were motivated by a combination of the immediate opportunity to gain material possessions and long-term social factors that impacted their lives. Many mentioned ‘lack of opportunities,’ ‘disappointment with the system,’ and ‘unfair stop and searches’ as their motivation. Research by [Kawalerowicz and Biggs \[2015\]](#) finds that there was a preexisting difference in treatment by the police. Areas where prior to the riots people felt disrespected by police saw more rioters coming from them, while areas with good police relations had fewer rioters join in. The research also shows that rioters came disproportionately from disadvantaged areas and were poorer. Lastly, there were striking differences in integration into society between the rioters and the general population. Although the vast majority of rioters were British citizens (86% of those sentenced to prison, the only sub-population for which data is available) [\[Ministry of Justice, 2012\]](#), only 14% of those interviewed said they really felt a part of British society (the national average was 53% at the time) [\[Lewis et al., 2011\]](#).

3 Data

3.1 Mappiness

The Mappiness dataset [\[MacKerron, 2012\]](#) is a large voluntary sample of the UK population. It is administered through a smartphone application that anybody can download for free and prompts

respondents usually twice a day.¹ After providing personal information when signing up,² people fill out how happy, relaxed and awake they feel, with whom and where they are, and what they are doing at random, prompted times. While they can join and leave at any time, respondents in 2011 took part for a median of 61 days (that is, two months), producing a rich panel with daily responses that is unusual in its scale.

The question on happiness (relaxedness) is phrased, ‘Do you feel happy (relaxed)?’; the respondent can answer on a sliding scale with one end point denoted as ‘not at all’ and the other as ‘extremely.’ An advantage of the phone application is that it doesn’t anchor the question with visible numbers, but with a sliding scale on which respondents can select any point that the phone’s pixels can register. A continuous variable is created using this scale. For the purpose of the analysis, the results are scaled between 0 and 100 afterwards, offering a much finer gradient of responses than most surveys allow. Focusing on the momentary happiness of individuals as opposed to their life satisfaction also contributes to the growing literature estimating causal effects on wellbeing using this metric. Momentary happiness, the affective counterpart of the evaluative life satisfaction, is gaining traction in the literature, such as with recent research on the relationship between work and happiness [Bryson and MacKerron, 2017].

Respondents also report at each prompt what activities they are undertaking at the time of answering. From a list of 40 options (and ‘Something else’) people can choose one or multiple that describes their immediate situation. For example, one individual on the third day of the riots reported that they were ‘watching TV’ at the time of answering; another person was ‘talking, chatting, socializing,’ ‘drinking coffee, tea,’ ‘texting,’ and ‘browsing the Internet.’ In particular, activities related to communication and information seeking will be of interest here, as the literature on crime (which are similar to the riots in their violent nature) and research on natural disasters (which are similar to the riots in their unpredictability and rarity) suggest that individuals are most likely to change these behaviors [Becker and Rubinstein, 2004, Perry et al., 2001].

3.2 Weather and daylight information

The British Atmospheric Data Centre’s Met Office Integrated Data Archive System (MIDAS) provides hourly spatio-temporal information for the respondent’s momentary GPS location on various measures. These include wind speed, air temperature, sunshine duration, and rain measurements.³ These are used as controls to avoid attributing weather effects on wellbeing to the riots. Daylight information for each date and location comes from R’s *StreamMetabolism* package.

3.3 Information on the riots

The Guardian newspaper collected a list of all confirmed riot events as the riots were unfolding and compiled a publicly available dataset of 245 events.⁴ Each entry contains information on the day (and, for about a third of them, also on the specific hour) of the riot event, the location given as an address (or sometimes shop name), and a short description of the event Table 1 contains a list of all events categorized by criminal law based on severity,⁵ as an overview. If one description contained two different type of crimes, such as a shop that was looted and stolen from, then it is put into the more severe category. When excluding the shooting of Duggan that occurred two days before the riots and served as a catalyst, as well as locations in the ‘Other’ category, a total

¹While there are plenty of responses from other countries, the paper only uses ones given at any location within the United Kingdom. This also helps avoiding Mappiness participants on foreign holidays influencing the results. Responses also have separate information for when the prompt occurred and when the respondent filled out the questions. If these two took place more than 60 minutes apart, then I exclude them because a probability sample of response moments is required, and moments when people choose to respond (rather than happen to be prompted) are unlikely to be random.

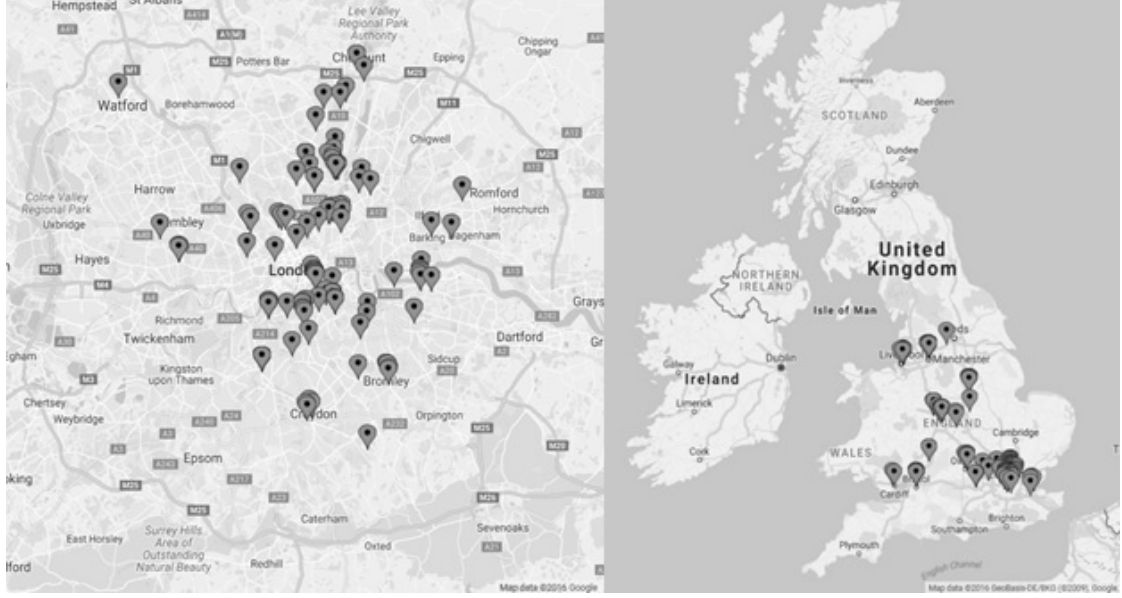
²The demographic information – such as whether someone is married or employed – provided at signing up is treated as constant over the period of weeks considered in this research.

³See more on weather data here: <http://catalogue.ceda.ac.uk/uuid/220a65615218d5c9cc9e4785a3234bd0>

⁴<http://www.theguardian.com/uk/datablog/2011/dec/06/england-riots-shops-raided#data>

⁵Severity of each event is determined based on categories used by the Home Office, except for criminal damage being divided into two categories, arson, and all other criminal damage. This is done so that arson, a particular characteristic of riots, clearly shows in magnitude in comparison to other cases. The classification was done by evaluating each short description provided in the Guardian dataset. The categorization was reviewed by a lawyer for accuracy.

Figure 1: Map of riot locations in London, and overall in the UK



of 224 treated locations remain.

The geographical unit most fitted for analyzing the localized effect within the UK is the level of Local Authority. Local Authorities (LAs) are units of local government, usually the size of a city district or a smaller standalone town. London, for example, has 33 Local Authorities. This geographical unit allows analyzing reasonably small areas to estimate a localized effect, as well as enough Mappiness responses from the neighborhood for meaningful analysis, something that couldn't be done if only considering the very street or block treated. Therefore, I identify each specific location's associated LA and find that nationwide the events fall into 39 Local Authorities.⁶

Table 1: Type and frequency of riot-related crimes

Crime type	Number of events	Examples
Violence against the person	22	Murder, stabbing, clash with police with injuries in some cases
Arson	51	Fire lit on buildings, cars, shops, bins
Criminal damage (excluding arson)	80	Windows, windscreens smashed, shops damaged, cars attacked
Acquisitive crime	58	Shops looted, raided
Disorder	14	Groups gather, vandalism, graffiti
Other	20	Roads closed off, evacuation due to risk

3.4 English Indices of Deprivation

The rioters perceived themselves to lack opportunities that were more available to others, specifically economic opportunities such as having a job [Lewis et al., 2011]. The English Indices of

⁶Events in the 'Other' category all occurred in areas with actual riot events, so including or excluding these events in terms of determining treated neighborhoods doesn't influence the analysis.

Deprivation can identify areas with residents in similar circumstances, as it measures the level of different aspects of deprivation for each Local Authority in the country.⁷ If the riots were an expression of a larger discontent, then people in these deprived areas might feel differently to people in areas without deprivation. Therefore, the English Indices of Deprivation allows analyzing whether people more similar to the average rioter reacted differently to the events to the rest of the society.

The deprivation data is published every five years. The analysis uses the 2010 release, which has data from the year 2008⁸ and is available at the LA level. I focus on two metrics in particular: the indices of employment deprivation and of skills deprivation. Employment deprivation is measured via the proportion of people on Jobseeker’s Allowance and Support Allowance among the adult population in the LA, while skills deprivation is based on the proportion of adults with low attainment, skills, and English knowledge. Independent research published by the Cabinet Office suggests that both types of deprivation were typical of the rioters and also match some of their own interpretations for their motivations [Morrell, 2011]. In my research, I consider LAs with the top 25% highest proportion of skills/employment deprived residents to be particularly characterized by that.

3.5 Racial and local wealth information

The proportion of non-White participants in the riots was disproportionate to their presence in society; however, interview participants did not consider the riots to be “race riots.” This tension makes it particularly important to focus on how people responding from disproportionately non-White neighborhoods reacted to the riots. To capture the racial and wealth divide, we have to look closer than using Local Authorities, because race and wealth divisions tend to be particularly sharp geographical divides. Therefore, here I use the geographical unit of Lower Layer Super Output Areas (LSOA). LSOAs have about 1,500 residents, on average, and usually make up a few city blocks. They are compact areas that are more likely to encompass similar individuals. London, for example, has 4,835 LSOAs (as opposed to 33 LAs).

Therefore, for measuring the specific impact in non-White areas, I limit my analysis to Greater London, the only area that has such geographically detailed information on race, and use the LSOA Atlas of the Greater London Authority.⁹ Similarly to the deprivation data for LAs, the LSOA Atlas provides information on the proportion of certain groups in each LSOA. From this, I can identify the areas with the top 25% Asian and Asian British; Black, African, Caribbean, and Black British; and Black, Asian, and minority ethnic¹⁰ (BAME) residents. Black areas saw more rioting than others, with 50.7% of the top 25% most Black neighborhoods having riots, while 31% of the 25% most BAME neighborhoods having riots, and 9.9% of the most White and most Asian neighborhoods having riots. Lastly, I also look at areas with the top 25% house prices to analyze how the well-off reacted during the riots.

4 Empirical strategy

The Mappiness data is unique in that it provides information on the riots’ effects already while the riots took place, as opposed to most research that has to use post-event measures to approximate effects. As there is data on the effects of the treatment for the process of the treatment taking place, I compare in the analysis respondents’ level of wellbeing from before the riots to during them. The time of ‘treatment’ is defined as the 5 days of the riots (Saturday to Wednesday), and the time before the treatment as the 5 days before the shooting of Duggan (Saturday to Wednesday again), leaving out the Thursday and Friday between the two categories. On the first of these two

⁷Deprivation data is not comparable among England, Wales, Scotland, and Northern Ireland, so this part of the analysis only focuses on England, where the riots took place.

⁸See more on the English Indices of Deprivation and download the data here: <https://www.gov.uk/government/statistics/english-indices-of-deprivation-2010>

⁹The population of Greater London is approximately 8.5 million. More on areal units in London here: <https://data.london.gov.uk/dataset/lsoa-atlas>

¹⁰A definition used in the UK to refer to members of non-White communities. Similar to the North American PoC.

excluded days, Mark Duggan was shot, and on the second the news of the shooting spread, both of which directly led to the protest and riots, so these days are excluded for not being strictly ‘before treatment.’

According to the news at the time and the Guardian dataset with riot events, the riots only started around nightfall on each of the five days. Sunset in London on 6 August 2011 (the first night of the riots) occurred at 8:41 p.m., and dusk is usually about 30–35 minutes long. Therefore, in the analysis, I categorize all responses from an area with riots starting there that evening untreated until 10 p.m., and treated from 10 p.m. onwards. From a location experiencing riots on a given night, all following responses within the five days were then considered treated; once an area was exposed to the riots, it remained affected regardless of the hour of the day. To measure the impact of the riots, I test how a response from an area with riots where at least one riot event already took place compares to the same individual’s responses before any of the riots started there. I test this using a difference-in-differences model where for individual i in area a at time t :

$$Y_{iat} = \alpha_i + \beta R_a + \gamma D_t + \delta(R_a \times D_t) + \epsilon_{iat} \quad (1)$$

where α_i is the individual fixed effect, R_a is a set of 406 dummies controlling for the unique characteristics of each Local Authority in the United Kingdom, D_t is a set of 10 day dummies for each of the five preceding days and each of the five days during the riots, while the interaction term, $R_a \times D_t$ is a dummy variable taking up 1 if the response is from one of the Local Authorities with riots and the riots have already started in that specific Local Authority. Because each area experienced riots from a different day onward during the five days of the riots, the interaction term takes the value 1 from different days onward depending on the location.

Let me illustrate the empirical strategy with an example using three different Local Authorities in London. The Local Authority of Bexley didn’t experience any riots, so the interaction term is 0 throughout all 10 days, and responses from here make up part of the control group. Haringey, where the riots first broke out, experienced riots naturally already on the first night, so the interaction term is 0 for the pre-period and the daytime of the first day, and takes the value of 1 from 10 pm on the first day, and for the full four more days of the riots. Camden, however, was free from riots for the first two days, and only had riots starting on the third. Consequently, the interaction term for responses from Camden is 0 for the pre-period of five days, the first two days of the riots, and until 10 pm on the third, and then 1 for the night of the third, and the whole of the fourth and fifth days.

This difference-in-differences strategy, however, carries the assumption that people in areas with no riots—such as Bexley—were completely untreated. This is unlikely, given the spread and extent of the riots and the news coverage they received at the time. Therefore, any estimation will serve as the lower bound of the effect in treated areas, where the real effect would likely be higher if the comparison group were truly untreated,¹¹. To measure how big the real treatment might be, I look at the size of the treatment effect in untreated areas, comparing unaffected areas before the riots to the same areas during the riots. This model hinges on the assumption that no other event took place during the riots that could have influenced people in all areas of the country to such an extent. This assumption is supported by research, finding that the riots were the main news item during the time and received “blanket coverage in the UK media” [Reeves and de Vries, 2016]. I measure the effect in untreated locations using a panel regression for individual i at time t as follows:

$$Y_{it} = \alpha_i + \gamma D_t + \epsilon_{it} \quad (2)$$

where D_t is a dummy taking up value 1 for responses during the five days of the riots, and 0 before, and ϵ_{it} is the error term. Therefore, the approximate full effect for a person responding from a treated area is the result of the difference-in-differences model plus the simple panel regression model:

$$Y_{iat*} \approx Y_{iat} + Y_{it} \quad (3)$$

¹¹In search of a truly untreated comparison group we could think about Northern Ireland (or the Republic of Ireland) because the geographical divide of the sea (and the latter being a separate country) might make for a stronger assumption that they were not affected. However, the number of responses in these locations in the observed short time frame of the riots is insufficient for such a comparison.

5 Descriptive statistics

There is a total of 12,731 responses from the United Kingdom for the five days of the riots and the five days prior to them, evenly split between the preceding five and the five during. 23% of these fall into LAs where at least one riot event happened. These responses come from a total of 1,368 individuals who responded at least once in the 5 days before and at least once during the quasi experiment.

Because Mappiness is a smartphone application and these were not yet in such widespread use in 2011, one expects respondents to be better off than the public in general. Indeed, the median household income among participants is £48,000, while in the UK population in 2011 it is £23,208.¹² The gender balance of the sample is identical to that of the population, with 51% being female in both.¹³ The median age is 39 years in the UK, while 33 among the participants, and likely due to that, the percentage of households with children is substantially different (57% in the population,¹⁴ 30% among participants), meanwhile employment levels are 8% higher among Mappiness respondents (70%¹⁵ to 78%).

The Mappiness is not a nationally representative sample, and these differences are partially due to who the select individuals are who could afford a smartphone in 2011. But they are also due to the fact that the Mappiness heavily oversamples Londoners (39% of respondents are Londoners, while Londoners are only 12% in the UK population). This being the UK's richest city with a strong presence of young, working people, the differences to the national average are understandable. This oversampling also carries an advantage though, because the riots also disproportionately occurred in London Local Authorities (20% of London LAs had at least one riot, while only 5% of LAs elsewhere), so the sampling of Mappiness is helpful in accessing enough respondents close to the riots.

In the analysis, the riots are considered a treatment that affects respondents. However, for the results to be valid, it is a prerequisite that the riots do not affect participation. Various robustness checks show such an effect not to be present. For example, participation rates before and during the riots are unchanged, so it's not the case that the exogenous variable of interest would have influenced attrition, people didn't join less, or leave the study earlier because of the riots. People also took the same length of time from prompt to response before and during the riots, there is no significant difference for an individual in their signal-to-response time. Unanswered signals were also not showing any peak during the riots. Over the course of 2011, the signals left unanswered grew steadily, likely because the Mappiness application was rolled out in late 2010, and by mid-2011, people were slightly less active in taking part. This pattern occurs when comparing the proportion of unanswered signals before and during the riots too; however, it's part of a trend and not a singular case.

The other aspect of rioter-survey participant interactions could be whether any individuals belonged to both groups. While this cannot be completely ruled out, it is extremely unlikely because of the relatively small size of the two groups and the difference in average demographics. While certainly not definitive proof, there was no response recorded at a riot location and during a riot. Furthermore, the riots also didn't alter the proportion of responses coming from one's home, the same amount of people chose to be at home as before. There was however a slight increase in the proportion of responses coming from one's home LA, but not a change in the proportion coming from urban versus rural areas. Overall, people didn't seem to flee large cities, nor close their front doors for days, but just stayed somewhat closer to home than usual. Finally, I also don't observe a change in country-wide happiness levels in the six months preceding the riots. It could still be the case that for certain subgroups there was a growing unhappiness that might have contributed to the riots. However, to test that, one would have to make assumptions about who they are, and

¹²Measuring National Wellbeing <http://www.ons.gov.uk/ons/rel/wellbeing/measuring-national-well-being/life-in-the-uk-2014/art-mnwb-life-in-the-uk-2014.html?format=print>

¹³Source for gender and age information: Office for National Statistics, 2011 Census. <http://www.ons.gov.uk/ons/rel/census/2011-census/population-and-household-estimates-for-the-united-kingdom/stb-2011-census-population-estimates-for-the-united-kingdom.html#tab-Key-points>

¹⁴Labor Force Survey <http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcn%3A77-328237>

¹⁵Office for National Statistics. <http://www.ons.gov.uk/ons/rel/lms/labour-market-statistics/october-2011/statistical-bulletin.html>

that would lead us to an entire separate analysis beyond the scope of this paper. What can be noted here is that, overall, the country didn't exhibit any trend in happiness levels that could have suggested the riots were 'brewing.'

6 Results

6.1 Unhappiness and stress in areas with riots

I compare responses from the (yet) untreated locations to responses from LAs with riots once riots occurred there, and observe a substantial growth in unhappiness and stress for people responding from treated areas. This persists once controlling for individual fixed effects and clustering the standard errors both at the location and the individual level, as seen in the preferred specification, Model (3). According to Model (3), being in a Local Authority once riots started there leads to a 2.3 point decrease in happiness and a 2.7 point increase in stress for an individual.

As noted in the empirical strategy, the difference-in-differences model presented in Model (3) is a lower bound of the local effect. Model (4) estimates the effect of the riots on people in areas without riots, and I find that individuals in these areas also experienced a substantial wellbeing loss compared to their own levels a week before. This implies that there was a country-wide happiness and relaxedness drop beyond the localized effect.

Table 2: The happiness effect of being in a Local Authority with riots during the riots

	(1) Happy	(2) Happy	(3) Happy	(4) Happy
Riot already happened there	-2.930*	-3.042**	-2.257*	
	(1.157)	(1.173)	(1.105)	
During riots in untreated areas				-1.585* (0.712)
Day dummies for 10 days (10 dummies)	Yes	Yes	Yes	
Local Authority dummies (406 dummies)	Yes	Yes	Yes	Yes
Circumstantial controls		Yes	Yes	Yes
Individual fixed effects			Yes	Yes
Clustered standard errors: location	Yes	Yes	Yes	Yes
Clustered standard errors: individual			Yes	Yes
Constant	83.27	98.73		
N	12,963	12,937	12,731	9255

Model (1–3): Difference-in-differences estimates.

Model (1): OLS regression with location clustered standard errors. Model (2): OLS regression with location clustered standard errors and circumstantial controls. Model (3) (described in Equation (1)); preferred specification): Fixed effects panel regression with circumstantial controls and standard errors clustered at the location and the individual.

Model (4) (described in Equation (2)): Treatment effect in untreated areas. Fixed effects panel regression with circumstantial controls and standard errors clustered at the location and the individual.

Circumstantial controls: Weather: air temperature, sunshine duration, wind speed, rain; Response given during daylight or not; Hour of the day; Response sequence.

Note: The constant is lost in Model (3) and (4) due to applying multiway clustering.

Note: Full table available upon request.

Standard errors in parentheses

+ p<0.10, * p<0.05, ** p<0.01

Adding up Model (3) and (4) to get an approximate total localized effect it appears to be a drop in happiness of around -3.84, while stress increased with 4.96. It is not entirely straightforward to interpret the magnitude of the effect on happiness because most of the Mappiness data is related

Table 3: The stress effect of being in a Local Authority with riots during the riots

	(1)	(2)	(3)	(4)
	Relaxed	Relaxed	Relaxed	Relaxed
Riot already happened there	-4.327**	-4.406**	-2.739*	
	(1.325)	(1.334)	(1.239)	
During riots in untreated areas				-2.216**
				(0.718)
Day dummies for 10 days (10 dummies)	Yes	Yes	Yes	
Local Authority dummies (406 dummies)	Yes	Yes	Yes	Yes
Circumstantial controls		Yes	Yes	Yes
Individual fixed effects			Yes	Yes
Clustered standard errors: location	Yes	Yes	Yes	Yes
Clustered standard errors: individual			Yes	Yes
Constant	84.82	67.50		
N	12,963	12,937	12,731	9255

Models defined as above.

to personal, in-the-moment actions. In search of another national level experience to which we could compare the riots, we could look at sports. I find that the riots were at least twice as bad as when in soccer England lost on penalties in the semi-finals to Italy in the 2012 UEFA European Championship (it was a significant country level happiness loss of -1.42 points, suggesting that while this certainly wasn't a world event, it did have a strong impact in the UK). Alternatively, we could look at religious holidays. Here, one could say that for people's happiness the riots were worse than how good Christmas Eve is (Christmas Eve contributes 3.29 points to happiness).

On a personal level, having riots in the area a person responds from is worse than directly being in the process of commuting or traveling $\beta = -1.81$, and is similar to the experience of doing work $\beta = -3.78$ in the moment of response, the second most negative activity people ever report (behind being sick in bed). These latter examples are particularly telling of the severity, because the riots were able to induce a happiness loss surpassing the effect of certain activities while they are directly underway by the individual, even though most respondents were not in physical contact with the riots. Both of these types of comparisons suggest that the riots were a large negative externality for citizens near them.

I run falsification tests using the preferred specifications, Model (3) and (4), to test whether this pattern emerges at other times too. I impose a 'placebo riot' on the same locations 4 weeks, 8 weeks, and 12 weeks before the actual riots. I find that overall, respondents in the areas were not different from their 5 days earlier selves at the placebo times at 4 and at 12 weeks prior the riots, while at 8 weeks there's a negative difference significant only at the 10% level. The country-wide effect was completely unique to the time of the riots, the placebo times are all insignificant. With most of the tests not showing a significant outcome, it is likely that the main specification for the actual time of the riots indicates a causal effect of the riots on citizen wellbeing (see Appendix for results).

6.2 Persistence of effect

I find that the riots not only impacted people while they went on, but for weeks afterwards as well. As seen in Table 4, comparing the 5 days before the riots to 5 days 1, 2, or 3 weeks after it, the negative effect is strong and persistent in areas that didn't have riots. Areas with riots were also unhappy and stressed, but not more than other locations, as the insignificant difference-in-differences model suggests. The negative effect of the English riots lasted at least until the end of the summer, and it wasn't being exposed to them directly that drove the effect anymore, but that the English riots took place at all, in the size, reach, and persistence as they did.

Table 4: Happiness and relaxedness levels post-riot

		(1)	(2)	(3)	(4)	(5)	(6)
		1 week	Happy 2 week	3 week	1 week	Relaxed 2 week	3 week
Equation (1)	After	-5.110** (0.985)	-5.264** (0.939)	-5.349** (0.994)	-5.952** (1.055)	-6.991** (0.998)	-6.693** (1.116)
	Riots already happened there	-0.314 (1.172)	-0.630 (1.225)	-0.333 (1.198)	-1.049 (1.380)	0.180 (1.433)	-0.780 (1.326)
	<i>N</i>	12610	12312	12055	12610	12312	12055
Equation (2)	After	-1.574* (0.658)	-1.077+ (0.622)	-2.401** (0.845)	-2.071** (0.630)	-1.545* (0.624)	-2.837** (0.967)
	<i>N</i>	9193	8853	8740	9193	8853	8740

Model (1–6) top: Difference-in-differences. Fixed effects panel regression with circumstantial controls and standard errors clustered at the location and the individual.

Model (1–6) bottom: Treatment effect in untreated areas. Fixed effects panel regression with circumstantial controls and standard errors clustered at the location and the individual.

Model (1) and (4): July 30 to August 3 compared to August 13–17.

Model (2) and (5): July 30 to August 3 compared to August 20–24.

Model (3) and (6): July 30 to August 3 compared to August 27–31.

Note: Testing beyond August is avoided as with September multiple seasonal changes occur, and the wellbeing differences to early August aren’t convincingly driven by the riots alone anymore. Therefore, persistence effects are presented until the end of August.

Standard errors in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

6.3 Happiness change in areas with riots and characteristics similar to the rioters

Beyond the average negative effect in areas with riots, responses from some locations with special characteristics might show a particular trend. I test this using triple interactions, and focus here for simplicity only on the key dependent variable, happiness. The characteristics I analyze are aspects in which areas are similar to rioters, skills and employment deprivation and high percentage of non-White residents, and one in which they are dissimilar, affluence.¹⁶ Affluence, measured using the area’s median house price, is a good measure of established wealth and reflects on inequality built over generations better than income could alone. I interpret these results cautiously, because they only describe the neighborhood or city block the person responds from, not the individual themselves, even if the response area is likely indicative, to a degree, of at least some characteristics of the respondent.

Looking at Table 5, I find that areas with riots and high levels of Black British population were particularly unhappy. The coefficient is three times the size of the average local effect, and suggests that people in Black neighborhoods that saw riots were particularly devastated. The negative effect of the riots in Black neighborhoods also extends beyond those that experienced riots. A difference-in-differences test looking only at the time of the treatment and the racial composition of the area results in a similar significantly negative effect as the triple difference does (results not shown). This suggests that it is not only that Black locals were concerned about the riots that happened right there, but Black neighborhoods around the whole of London were significantly more distressed than usual.

One interpretation can tie this result to the fact that it was an unarmed Black man whose shooting preceded the riots. Furthermore, almost half of the participants were Black. Lastly, the media coverage of the riots might have had an impact as well. News and analysis at the time, while not

¹⁶ Another way to test this would be to look at those Mappiness users who are characterized by these themselves, as opposed to focusing on the location they are at. There is no data on race, but there is on employment. Unfortunately, the unemployed group is too small to give meaningful results when restricting the analysis only to them.

connecting the riots specifically to the Black community, did often use images depicting Black riot participants in their commentary. As Bateman [2012] finds, in the aftermath of the riots, White Britons had an increased sense of social distance, of cultural threat, and of prejudice towards Black Britons.

A similar pattern doesn't emerge in predominantly Asian British or BAME neighborhoods, which appear to be equally affected as other areas with riots. De Rooij et al. [2015] suggest that this might be due to how members of the Muslim community were often cast as protectors of their neighborhood in the news media, and all three victims of the hit-and-run accident were Muslims trying to stop rioters from looting in their neighborhood. Bateman [2012] also found that, as opposed to feelings towards Blacks, feelings towards Muslims remained unchanged; specifically among the White British who worried about increased violence, prejudice even decreased towards Muslims following the riots.

Areas with skills deprivation, as opposed to those with Black residents, were strikingly happy if riots took place in their neighborhood. Testing only skills deprivation and the time of the treatment in a simple difference-in-differences framework, as in the case of Black neighborhoods, reveals that all skills deprived areas in England were happy during the riots, regardless of whether the area had riots (results not shown). This could be due to a sympathy with the riots, people maybe were pleased that a larger discontent they have been experiencing on an ongoing basis has manifested in action, even if the initial peaceful protest quickly turned violent. It is worth being cautious with the interpretations though, as people in affluent locations also reported increased wellbeing, even if not to the same degree. To note, there are few respondents with responses during the riots which were from LSOAs which were both affluent and also had riots, so any interpretation of this last result should be limited.

If I exclude those who earn in the top decile of the British income distribution (above £50,000), I find consistent results with those presented in Table 5. Consequently, it is unlikely that a small, well-off, smartphone owning section of the sample would drive the results. 'Placebo riots' testing periods 4, 8, and 12 weeks before the real riots finds that none are significant, which suggests that the effects were indeed induced by the riots (see Appendix for results).

Lastly, there are two aspects of the riots that are untestable with this design. One of these is

Table 5: The riots' effect on happiness in specific neighborhoods

	(1)	(2)	(3)	(4)	(5)	(6)
	Greater London				England	
	Black British	Asian	BAME	High house price	Skills deprivation	Employment deprivation
Riots happened there	0.0784 (1.277)	-0.965 (1.367)	-0.721 (1.290)	-3.514** (1.085)	-2.363* (1.113)	-1.848+ (1.054)
Characteristic	-0.0260 (1.384)	1.665 (1.462)	0.993 (1.458)	-1.929+ (1.121)	-1.672 (1.025)	-0.300 (0.770)
Riots happened there * Characteristic	-7.492** (2.145)	-0.623 (3.966)	-4.146 (4.147)	4.743** (1.256)	7.984** (2.237)	-0.654 (2.041)
N	2936	2936	2936	2936	11,096	11,096

Model (1–6): Difference-in-differences-in-differences estimates comparing (i) treated areas (ii) during the riots (iii) with specific neighborhood characteristics. Fixed effects panel regression with circumstantial controls and standard errors clustered at the location and the individual.

Model (1–4): Responses within Greater London, as race and wealth information is only available here. Geographical unit: LSOA (small neighborhood level).

Model (5–6): Responses within England, including London. Geographical unit: LA (large neighborhood, or small city level).

Standard errors in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

the riots as an urban phenomenon. The riots manifested more often in spaces which the rioters routinely passed through and which were closer to their homes [Baudains et al., 2013]. Also, urban areas with a high proportion of young people and a shorter distance to shops and malls were more

likely to experience riots [Kawalerowicz and Biggs, 2015]. Indeed, almost all treated LAs are urban, which also means there aren’t enough treated rural locations to provide a reasonable sample size. Comparing all urban areas to all rural areas before and during the riots (regardless of whether a riot took place there), shows there to be no difference between them. People in smaller places were just as stressed and unhappy as urbanites.

The riots are also considered an English phenomenon. Out of the 225 riot events, 223 happened in England, and 2 in Wales. Research written in the aftermath refers to the events as “English” (as opposed to “British”) riots (see titles such as “The English Riots of 2011,” “The August riots in England,” “Reading the riots: investigating England’s summer of disorder” referenced earlier). However, because of the minimal of treatment outside England, triple differences cannot be applied to test whether people in the English versus the Welsh treated areas felt differently. Comparing the whole of England to the whole of Scotland (which didn’t have any riots) shows no difference. It appears that the United Kingdom as a whole underwent a severe loss of happiness; Scots had no sense of being spared from the riots at the time, and it is only looking back that this became apparent. This result also holds if I only compare all urban areas in England to all urban areas in Scotland.

6.4 Behavioral Changes

With quantitative research on riots and citizen behavior lacking, I turn to two other areas of study for forming hypotheses. Crime, an activity similar to the riots in its violent form, and natural disasters, similar in their unpredictability and rarity, provide guidance for possible behavior changes, which suggest a likely increase in communication and in information consumption [Becker and Rubinstein, 2004, Bourque et al., 1993]. In line with these predictions, I find that TV watching and, to some degree, personal communication (texting, email, and social media use) increased in areas with riots during the riots. Interestingly, ‘browsing the Internet’ remained unchanged. Triple differences using neighborhood characteristics suggests that people in areas with riots and with the highest proportion of BAME residents increased their personal communication even beyond other areas with riots. Meanwhile, respondents in areas with riots and within London had an extra increase in TV watching.

The newly devoted time to these activities must be coupled with another activity becoming less prominent, and indeed, I find a substantial drop in playing computer and phone games in areas with riots. It appears that once the riots started people quickly turned from imaginary worlds to reality. I also find that smoking grew somewhat in these areas (though my sample size is small — it’s harder for the prompt to catch someone mid-cigarette than mid-TV watching, due to the difference in the typical length of these activities). One explanation for the increase in smoking might be that people used this activity as a coping mechanism with the exhibited stress increase.

Lastly, I observe no change in the proportion of people working when prompted to respond.

Table 6: Activity changes in areas with riots

	(1)	(2)	(3)	(4)	(5)	(6)
	TV	Communication	Internet	Computer games	Smoking	Working
Riots happened there	0.561** (0.160)	0.369+ (0.207)	0.239 (0.211)	-1.431** (0.499)	1.036+ (0.564)	0.0440 (0.156)
<i>N</i>	9838	5699	5254	2609	942	8765

Model (1–6): Logit regressions with difference-in-differences estimates. The values provide the log odds of a given activity being undertaken by the individual at the moment of answering if in an area with riots during the riots, compared to the likelihood of such activity before the riots.

Model (6): Estimated using the dependent variable ‘working, studying’ on a restricted subset of respondents excluding students, in order to measure the change in working specifically.

Standard errors in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

This finding is contradictory to what media accounts would have us presume, which suggest that a number of businesses, at least in London, closed early during the riots [Newton-Small, 2011]. One explanation might be that jobs in metropolitan areas, or at least the white-collar ones, could possibly temporarily be fulfilled from home. So while businesses closed early, it didn't necessarily mean people ended up working less. This explanation is supported by the fact that a triple interaction of work during the riots in areas with riots and within London also shows no reduction in work, while focusing only on the afternoon and evening hours (when the early closures could have had resulted in a change) also show no significant difference in areas with riots.

7 Discussion

'This is criminality, pure and simple, and it has to be confronted and defeated.' So said David Cameron, the UK's Prime Minister during the riots [Telegraph, 2011]. According to him, 'we know what's gone wrong ... a slow-motion moral collapse ... irresponsibility, selfishness, behaving as if your choices had no consequences' [BBC News, 2011]. Kenneth Clarke, the then justice secretary, talked about 'criminal classes,' suggesting that the majority of participants were reoffender criminals, 'cut off from the mainstream in everything but its materialism' [Guardian, 2011]. 'These thugs,' as Mr. Cameron put it in this interpretation, caused the vast majority of the country to become victims to a crime of a few.

Social science research conducted in the aftermath came to somewhat different conclusions. Briggs [2012] in his analysis of participant interviews suggests that frustration and the lack of opportunities 'made them a population quite ready to counteract their structural position in an effort to send a message.' Qualitative research based on interviews with rioters found tensions with police were crucial [Lewis et al., 2011]. The interviews talked about an 'anger at what was felt to be discriminatory treatment,' and the shooting before the riots was considered a symbol of the perceived injustice.

Stepping away from these contradictory interpretations, this analysis aimed to measure the de facto emotional effect of the riots. My results suggest that the 2011 English riots caused a wellbeing loss for most people living in the United Kingdom. Comparing the week before the riots to the week of them, I observe significantly higher unhappiness and stress throughout the country. Those close to the riots experienced a severe wellbeing loss, but even citizens in areas that were unaffected by the disturbances were unhappy during the period that the riots went on. For those who were in neighborhoods with riots, the effect of the riots was the same magnitude in the negative direction as Christmas Eve is in the positive one.

Neighborhoods with high proportions of Black residents were particularly unhappy, while people in skills-deprived areas were happier during the riots, which latter result might suggest that there was a wider discontent that resonated with the riots. This would also suggest that the riots had a mixed effect, causing a loss of happiness to the majority, but not to all. During the riots, people substantially altered their behavior. Watching TV, texting, and using social media increased in neighborhoods with riots, and people here created time for these activities by turning to online and phone games less than before. Overall, the riots had clear externalities beyond the financial costs they imposed. Based on the estimations, I find that the welfare loss from riots was big - big enough that it perhaps overshadows the direct financial loss for most residents in the United Kingdom.

References

- Tim Bateman. With the Benefit of hindsight. *The English Riots of 2011: A Summer of Discontent*, page 91, 2012. ISSN 1904380883.
- Peter Baudains, Alex Braithwaite, and Shane D. Johnson. Target choice during extreme events: A discrete spatial choice model of the 2011 London Riots. *Criminology*, 51(2):251–285, may 2013. ISSN 00111384. doi: 10.1111/1745-9125.12004. URL <http://doi.wiley.com/10.1111/1745-9125.12004>.
- BBC News. England riots: Broken society is top priority - cameron, 2011. URL <http://www.bbc.co.uk/news/uk-politics-14524834>.
- Gary S. Becker and Yona Rubinstein. Fear and the response to terrorism: An economic analysis. Report, University of Chicago mimeo, 2004.
- Brian Bell, Laura Jaitman, and Stephen Machin. Crime deterrence: Evidence from the london 2011 riots. *The Economic Journal*, 124(576):480–506, 2014. ISSN 1468-0297.
- Linda B Bourque, Lisa A Russell, and James D Goltz. Human behavior during and immediately after the earthquake. *The Loma Prieta, California, Earthquake of October*, 17(1989):B3–B22, 1993.
- Nils Braakmann. How do individuals deal with victimization and victimization risk? longitudinal evidence from mexico. *Journal of Economic Behavior & Organization*, 84(1):335–344, 2012. ISSN 0167-2681.
- Daniel Briggs. Frustrations, urban relations and temptations. *The English Riots of 2011: A Summer of Discontent*, page 27, 2012. ISSN 1904380883.
- Alex Bryson and George MacKerron. Are you happy while you work? *The Economic Journal*, 127(599):106–125, 2017. ISSN 1468-0297.
- Eline A. De Rooij, Matthew J. Goodwin, and Mark Pickup. Threat, prejudice and the impact of the riots in england. *Social science research*, 51:369–383, 2015. ISSN 0049-089X.
- Mirko Draca, Stephen Machin, and Robert Witt. Panic on the streets of london: Police, crime, and the july 2005 terror attacks. *American Economic Review*, 101(5):2157–81, 2011. ISSN 0002-8282.
- Christian Dustmann and Francesco Fasani. The effect of local area crime on mental health. *The Economic Journal*, 126(593):978–1017, 2016. ISSN 1468-0297.
- Guardian. Kenneth Clarke blames English riots on a 'broken penal system'. 2011. URL <https://www.theguardian.com/uk/2011/sep/05/kenneth-clarke-riots-penal-system>.
- Rochelle F Hanson, Dean G Kilpatrick, John R Freedy, and Benjamin E Saunders. Los Angeles County after the 1992 civil disturbances: degree of exposure and impact on mental health. *Journal of Consulting and Clinical Psychology*, 63(6):987, 1995. ISSN 1939-2117.
- Jonathan Jackson and Mai Stafford. Public health and fear of crime: A prospective cohort study. *The British Journal of Criminology*, 49(6):832–847, 2009. ISSN 1464-3529.
- Juta Kawalerowicz and Michael Biggs. Anarchy in the UK: Economic deprivation, social disorganization, and political grievances in the London riot of 2011. *Social Forces*, 94(2):673–698, 2015. ISSN 0037-7732.
- Sheldon J Lachman. Psychological perspective for a theory of behavior during riots. *Psychological reports*, 79(3):739–744, 1996. ISSN 0033-2941.
- Sandra Laville, Paul Lewis, Vikram Dodd, and Caroline Davies. Doubts emerge over duggan shooting as london burns. *The Guardian*, 8, 2011.

- Paul Lewis, Tim Newburn, Matthew Taylor, Catriona McGillivray, Aster Greenhill, Harold Frayman, and Rob Proctor. Reading the riots: Investigating england's summer of disorder. 2011.
- George MacKerron. *Happiness and environmental quality*. Thesis, 2012.
- Robert Metcalfe, Nattavudh Powdthavee, and Paul Dolan. Destruction and distress: Using a quasi-experiment to show the effects of the september 11 attacks on mental well-being in the united kingdom. *The Economic Journal*, 121(550):F81–F103, 2011. ISSN 1468-0297.
- Ministry of Justice. Statistical bulletin on the public disorder of 6th to 9th August 2011 - September 2012 update. 2012. URL <https://www.gov.uk/government/statistics/statistical-bulletin-on-the-public-disorder-of-6th-9th-august-2011--2>.
- Andy Moore. Riots in tottenham after mark duggan shooting protest, 2011. URL <https://www.bbc.co.uk/news/uk-england-london-14434318>.
- Gareth Morrell. The august riots in england-understanding the involvement of young people. Report, National Centre for Social Research, 2011.
- Jay Newton-Small. After the Riots: the Economic Cost of London's Mayhem. *Time*, 2011. URL <http://world.time.com/2011/08/12/after-the-riots-the-economic-cost-of-londons-mayhem/>.
- Ronald W Perry, Michael K Lindell, and Kathleen J Tierney. *Facing the unexpected: Disaster preparedness and response in the United States*. Joseph Henry Press, 2001. ISBN 0309171970.
- Aaron Reeves and Robert de Vries. Does media coverage influence public attitudes towards welfare recipients? The impact of the 2011 English riots. *The British journal of sociology*, 67(2):281–306, 2016. ISSN 1468-4446.
- Catherine E. Ross and John Mirowsky. Neighborhood disadvantage, disorder, and health. *Journal of health and social behavior*, pages 258–276, 2001. ISSN 0022-1465.
- G James Rubin, Chris R Brewin, Neil Greenberg, John Simpson, and Simon Wessely. Psychological and behavioural reactions to the bombings in London on 7 July 2005: cross sectional survey of a representative sample of Londoners. *Bmj*, 331(7517):606, 2005. ISSN 0959-8138.
- Patrick Sharkey, Amy Ellen Schwartz, Ingrid Gould Ellen, and Johanna Lacoë. High stakes in the classroom, high stakes on the street: The effects of community violence on student's standardized test performance. *Sociological Science*, 1:199–220, 2014. ISSN 2330-6696.
- Telegraph. London riots: Prime Minister's statement in full, 2011. URL <http://www.telegraph.co.uk/news/uknews/crime/8691034/London-riots-Prime-Ministers-statement-in-full.html>.

Appendix

Table 7: Falsification test for treatment: 4, 8, and 12 weeks prior

		(1)	(2)	(3)	(4)	(5)	(6)
		Happy			Relaxed		
		4 week	8 week	12 week	4 week	8 week	12 week
Equation (1)	Riots happened there	0.760 (0.674)	-1.457+ (0.769)	-0.351 (0.764)	0.444 (0.711)	-1.298+ (0.785)	-0.0925 (0.755)
<i>N</i>		14558	18257	22023	14558	18257	22023
Equation (2)	In untreated areas	0.579 (0.559)	-0.232 (0.431)	-0.0850 (0.482)	0.781 (0.514)	-0.428 (0.458)	0.370 (0.519)
<i>N</i>		10194	12571	15327	10194	12571	15327

Model (1–6) top: Difference-in-differences. Fixed effects panel regression with circumstantial controls and standard errors clustered at the location and the individual.

Model (1–6) bottom: Treatment effect in untreated areas. Fixed effects panel regression with circumstantial controls and standard errors clustered at the location and the individual.

Model (1) and (4): July 2–6 compared to July 9–13.

Model (2) and (5): June 4–8 compared to June 11–15.

Model (3) and (6): May 7–11 compared to May 14–18.

Standard errors in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 8: Falsification test for areas with riots and neighborhood characteristics

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Black British			Skills deprivation			House price		
		4 week	8 week	12 week	4 week	8 week	12 week	4 week	8 week	12 week
Riots	happened there	0.565 (0.778)	0.731 (1.199)	1.420 (1.121)	1.077 (0.703)	-1.100 (0.781)	-0.469 (0.787)	0.670 (1.269)	0.414 (1.422)	0.454 (1.136)
Characteristic		-2.001 (1.744)	1.247 (1.701)	0.189 (1.078)	-0.598 (1.023)	-0.585 (0.810)	-0.519 (0.811)	-0.724 (1.135)	0.783 (0.937)	-0.477 (1.495)
Riots	happened there	1.843 (1.926)	0.728 (1.689)	-0.835 (1.557)	-2.181 (2.563)	-4.525 (3.298)	-1.638 (3.162)	0.447 (1.705)	0.685 (1.351)	1.510 (1.136)
* characteristic										
<i>N</i>		3760	4748	5729	13,042	16,207	19,654	3760	4745	5729

Model (1–9): Difference-in-differences-in-differences estimates. Models as described in Table 5.

Model (1), (4), (7): July 2–6 compared to July 9–13.

Model (2), (5), (8): June 4–8 compared to June 11–15.

Model (3), (6), (9): May 7–11 compared to May 14–18.

Standard errors in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$